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Supervised Project Report
(ANTA604)

Polar Psychology and the implications for Antarctic Health and Safety

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Abstract/executive summary (ca. 200 words):

Antarctica is an unpredictable and extreme environment which has a substantial number of casualties from past ill-fated events. What Antarctica New Zealand has employed is a Health and Safety Policy with the purpose to protect all those under it from harm. Recent change in legislation has transformed the health and safety space in New Zealand from a more reactive approach to one more proactive in function with incentive for top down management. On top of this is the integration of the effects of behaviour in dealing with hazards. In polar psychology there are a number of impacts from residing is such an extreme environment which can be utilised in the implementation of health and safety. This leads to the conclusion that one of the most effective tools in achieving the goals under ones health and safety policy is selection of people who have the right mindset. This mindset of dealing with environmental stressors can result in a team that is fit to tackle challenges that occur in the challenging environment that is Antarctica.

Contents

1. Introduction

“Antarctica is a paradox. Its picture postcard beauty extends a friendliness that draws you out to investigate, but this attractiveness belies the continent’s true nature as an extreme harshness that man can never tame. Danger lurks constantly. Poor preparation, taking shortcuts or pushing limits can get you into trouble very easily in this unforgiving environment” (Herrick, 1997).

This excerpt from, “A year on Ice, Living and working in Antarctica” by Warren Herrick succinctly describes the peril that all Antarctic explorers observe. The natural beauty of the continent will draw one in to investigate, such that small mistakes are overlooked. This small error can lead to big problems in the unforgiving and unpredictable environment. To manage these phenomenon a number of strategies are employed by Antarctica New Zealand to keep those working for, with or visiting the continent safe. The main method of achieving this is the implementation of an organisation wide Health and Safety Policy. Further, there are a multitude of psychological ideas that directly relate to behaviours exhibited in Antarctica that when understood can help improve methods to keep people safe from harm.

Antarctica has long been known as a place of great danger, but effective management barriers can be put in place that ensure the safe and effective undertaking of work in Antarctica. What I aim to achieve with this report is to carry out a general evaluation of the origin and implications of Health and Safety in Antarctica. This will begin with an overview of the legislative requirements enforced by the government on Antarctica New Zealand through the Health and Safety at Work Act 2015. Building on this I will explore the need for effective Health and Safety in Antarctica especially for those working over the winter months.

From there I will focus on the general polar psychology concepts that have implications for Health and Safety on the Antarctic continent. These concepts extend to both the effects of isolation from the outside world as well as what to look for in personnel in order to make the organisation effectively function. This evaluation will include a number of past recollections of time spent at Scott Base with particular focus on the extraordinary hazards that occur on the continent. Linking in with this, four factors that increase the likelihood of accidents in a general occupancy will be discussed alongside the psychological ideas that cause them to occur. To further reinforce the ideas expressed by past travellers

the report will include observations made by a first time traveller as a part of the Postgraduate Certificate in Antarctic Studies field trip to Antarctica (PCAS 19).

The structure this report will follow will allow for a complete overview of what Health and Safety policy employed by Antarctica New Zealand and why they do so. Finally, the notion that Antarctica is becoming less extreme will be explored.

2. Health and safety: why has it come about?

2.1. Health and Safety in the context of Antarctica as an extreme environment

Antarctica is and always will be an extreme environment that humans will struggle to reside in without considerable aid. What makes Antarctica so unfavourable for human survival is a set of climatic factors that are outside what humans can comfortably sustain life within (Belkin, Dyurgerov, Finaev, & Soroko, 2016). Assessing these conditions form the basis for implementing life supporting systems and personal protective equipment that protect personnel from the elements (Belkin et al., 2016).

Activities on the Antarctic continent have rapidly expanded as technology has allowed humans to live more comfortably in the extreme conditions. The heroic era saw a high proportion of accidents take place relative to the number of people on the continent at the time (Ward, 2001). An important concept that must be understood when referring to Antarctica is that the likelihood of unfortunate events occurring is similar to other areas of occupation, but the consequences of such an event are far more severe in Antarctica than what may occur elsewhere (Belkin et al., 2016).

Since the explorer age of Scott and Amundsen many leaps have been made in the technological capabilities of people travelling to Antarctica. An article written by Belkin et al. (2016) explores the revelation that the majority of states who occupy stations on Antarctica have built sectional housing with central heating and a supply of water which greatly increases capabilities in terms of ability to reside for long periods. On top of this there has been the development of special Antarctic clothing and equipment as well as advances in the capabilities of vehicles designed for travelling inland. In regard to the ability for workers in Antarctica to undertake their occupation, despite advances in other aspects of life on the continent, still remains is the difficulty in undertaking tasks outside of the base confines. The

activities tend to be difficult to execute and dangerous, requiring strong concentration and focus for a long time period with significant physical exertion.

This piece really highlights the importance of personnel selection as a mechanism of adhering to and achieving the goals set out in the Health and Safety policy by Antarctica New Zealand. Personnel not only need to be healthy and physically fit, but also mentally compatible with the highly irregular environment. In broad psychology terms, this extends to a low level of neuroticism, ability to communicate effectively, high social compatibility and effective conflict resolver, in other words, all the desired traits of a good human being (Steel, 2016).

3. Health and Safety in New Zealand

Health and Safety in the workplace in New Zealand has become more prevalent in the last 30 years. Overall the shift has come from the realisation that all people have the right to go to work and come home safely. In New Zealand, until 4th April 2016 any health and safety matters came under the Health and Safety in Employment Act 1992. After this date the 1992 Act was replaced with the Health and Safety at Work Act due to recommendations from the Independent Taskforce on Workplace Health and Safety.

This has resulted in a shift from a more "tick the box" process in identifying and dealing with hazards, to a more proactive approach where hazards are identified with the behaviour of the employee in mind, "sure, a hammer can be a hazard but only if it's in the wrong hands" (Milford, 2017). This more proactive approach has employed a system where risk management involves revisiting the likelihood and consequences of exposure to a hazard when any parameter of the situation changes (Milford, 2017). This behavioural focus draws more links to human psychology aspect of safety at work rather than the physical hazards themselves.

3.1. Antarctica New Zealand Health and Safety Policy

Antarctica New Zealand is a Crown entity that carries out all New Zealand government activities in Antarctica. As mentioned earlier, as an entity under New Zealand Law a Health and Safety policy to govern and guide the health and safety process is in place in line with the 2015 Act (Antarctica New Zealand, 2015)(See Appendix.1). The goal as described in the document declares the vision "to

continually improve the health, safety and wellbeing of our staff, contractors and visitors to ensure no one is harmed". Put in context, Antarctica New Zealand demonstrates awareness that this vision is undertaken in a highly dangerous environment, with the policy covering diverse hazards both in Antarctica and in New Zealand. Some notable highlights of this policy statement include the importance of the people involved in the operation and the fact that zero harm for people within the organisation is a dedication rather than a goal.

Outlined in this document are the actions that Antarctica New Zealand must take to achieve the vision. This includes recognising employees' expertise and insight to support continuous improvement of Health and Safety practices. On top of this and in line with current legislation, a more proactive approach to hazard identification is employed. In general terms, the policy statement also expresses the movement to more managerial involvement in the process through top down management of associated processes (Antarctica New Zealand, 2015).

3.2. Implications for Antarctica

Scott Base is run by Antarctica New Zealand as a government agency tasked with carrying out New Zealand activities in Antarctica. As such the actions taken and planned in New Zealand and in Antarctica must be in accordance with New Zealand law. This means that personnel travelling to Antarctica who are working with Antarctica New Zealand have a right to go to work and come home safely. This is in accordance with the Health and Safety at Work Act 2015 (New Zealand Government, 2015).

But as is the case with employers that operate in high risk areas, extra care must be taken to counteract this risk the environment poses. This is what the new Act aimed to pursue. The aim is to facilitate a movement away from the recording based system of the 1992 Act to a more proactive system where hazards are identified before they cause harm. This is achieved with a emphasis on human interaction with said hazards (Milford, 2017).

4. Past recollections

4.1. Antarctic extremes from an experienced traveller

Antarctica is a place of great beauty, yet when we delve into past experiences of travellers we find that the extreme beauty can be replaced by extreme harshness when the conditions become unfavourable. One account mentioned earlier by Warren Herrick is as follows; "*Bad weather can halt all movement in the field and such conditions can last for days. Winds of over 28 knots can drift loose snow and reduce visibility towards zero. Uniformly overcast conditions over snow-covered surfaces result in 'whiteouts', where no surface or horizon can be defined. An Air New Zealand DC10 experienced this phenomenon when it crashed into Mt Erebus in November 1979, killing 257 people".*

Another account written by Noel Kemp in an Australian informative piece describes the conditions in Antarctica as follows, "When the weather in Antarctica is good it is a joy to be in. The skies are a beautiful blue – the azure blue you can see only from high mountains in other places – for twenty-four hours a day in summer... The wind is so strong now that you have to lean into it. It is probably about forty knots (20 metres a second)"

What these statements outline is the swift change in conditions that are what the overarching health and safety policy employed by Antarctica New Zealand is attempting to protect against. The hazards mentioned in these recounts are similar to that of the perils encountered by both the men of the heroic era and explorers of today.

4.2. Observations from a first time traveller

As a method of better understanding the steps undertaken to impart knowledge on health and safety on the Antarctic continent observations were recorded both through the process of preparing for, then landing on the continent. These observations were recorded as a virgin Antarctic traveller with no prior experience of what hazards are present in Antarctica. The observations were as follows:

4.2.1. Prior to departure

Early in the process of completing the Postgraduate Certificate in Antarctic Studies it was made clear that Antarctica is still a great wilderness, as such it must be treated with caution and respect. In terms of preparation from a health and safety point of view the PCAS participants are exposed for a lot longer to the idea of Antarctica as a dangerous place. This is compared to other travellers that are potentially employed for a position on Scott base. This extends to five weeks of lectures covering every aspect of the continent. Despite extensive theory based learning about hazards, the first real exposure to the hazards present in Antarctica was discovered at a field trip to Cass where both camping methods and the appropriate clothing to be used were demonstrated.

As a whole, the notion was present that if one was determined enough to get to the continent through science or other means, one is usually aware of the associated hazards and how to manage them. Initial mentions of this were realised in the first social event where past members of the course alluded to the rules imposed on us as first time visitors. More so than this was the notion that more permanent residents of the base would not be as welcoming as previously thought.

4.2.2. During Antarctic visit

What greeted us on arrival to the Ice was a flurry of activity. McMurdo Station personnel managed the transportation from the runway to Scott Base with practiced efficiency. Once on Scott Base we were briefed on the main rules applicable before Antarctic field training (AFT) was complete. This included a no movement beyond the footprint of the station instruction, general housekeeping rules and a quick overview of the main hazards encountered whilst moving around base.

The following two days AFT involving all aspects of Antarctic health and safety was completed before we could move into the field. As a whole this training was exhaustive for the hazards that we were potentially going to encounter during our time on the Ice.

5. Psychology in extreme environments

Gary Steel, a renowned polar psychologist based at Lincoln University in Canterbury discusses at length the field of Polar psychology research from the last 50 years in his chapter, Extreme and Unusual, Psychology in Antarctica. Although this piece has more implications for winter over personnel, the ideas remain the same for other occupational situations whilst working in and around Antarctic Stations. What this paper does express is the notion that health and safety is based on decision making. Consequently, strenuous situations that personnel are exposed to in Antarctica can have an effect on a person's ability to make rational decisions that align with health and safety protocols. To a further extent, Steel expands on the effects that irregular light and social stimulations have on human behaviour. This behaviour of action or inaction in identifying hazards can be the difference between two different outcomes in such an unforgiving environment (Steel, 2016).

To cover the general psychology issues presented in an isolated environment, Gary Steel discusses the idea of the three abilities; task ability, sociability and emotional stability. Task ability refers to the ability of one to complete a set task. This is especially important in winter over crews where one person will hold a number of occupations, hence when one has poor task ability, the rest of the crew will usually suffer in some way. Sociability refers to the ability for one to interact smoothly with other people. This becomes vitally important when in a small group as knowing when and how to react can change the course of a relationship. Lastly, Steel discusses emotional stability. This is important as it allows for predictability in manner so that peers know how to deal with their peers and vice-versa. What the combination of these implies is how well one is going to function when the challenges are met during the winter months. This can then be used to help improve selection techniques and not only lower the cost through lower accident occurrence but also ensure that employees make it home at the end of the season.

Additionally, with the fact that Antarctica is so isolated and the reliability of transport to and from the continent sometimes unpredictable even in the summer months, personnel can sometime exhibit these symptoms without the extreme environmental conditions of winter months.

5.1. Mental Effects of Environment

One factor that is of importance in the implementation of health and safety protocols mentioned in this piece is the apparent “different state of consciousness”. This state of consciousness was named long eye, (Rohrer, 1961), due to the tendency for people to stare into space for long periods of time. In one of Rohrer’s studies a participant was described as having a “twelve-foot stare in a ten-foot room”. This links back to the mental fitness of one to carry out an occupation in an environment that requires immense concentration with dire consequences if something were to go wrong. Steel then goes on to discuss that this condition is not unique to Antarctica, with most experiencing the condition whilst undertaking a mundane drive on a familiar route, only to arrive at the destination to realise one has little recollection of the trip there.

The implications from a health and safety point of view, and as explored by Steel is the notion that the condition comes about through a low stimulation environment. As is with most stations on the Antarctic continent, there is limited space to live and work in which leads to an extreme familiarity after a number of months in the same area. Leading from this is what is called the Third Quarter Phenomenon. This idea came from research conducted by Robert Bechtel (1991) who after analysis of literature on isolated environments found that the lowest point in terms of primarily mood and morale comes about two thirds through the stay (Betchel & Berning, 1991). This has links back into the different state of consciousness discussed by Rohrer where the lowest mental state occurs around the same time regardless of the length of deployment.

In saying this, psychological implications of Antarctic inhabitancy are not all negative. In fact, the early research portrayed the implications in a much more negative light than what is now known. One notion explained by Steel is the idea that the people that apply and travel to Antarctica to undertake a position are rewarded by the enjoyment of overcoming challenges and the ability to reflect after being away from the routine of normal life (Steel, 2016).

To put this polar psychology into perspective, the ideas around New Zealand Health and Safety fundamentals are important. Before the 2015 Health and Safety at Work Act there were a number of occupations that were falling behind in keeping their workers safe (Worksafe New Zealand, 2016). Although this likelihood of an accident is related to the occupation in question, those in management were not seen to have enough incentives present to keep their workers from coming to harm. The new method of Health and Safety then transformed into a more proactive landscape where employees were

trained in how to minimise risk of accident or better eradicate the hazard altogether. By allowing employees to impart newfound knowledge through hazard identification to management in the company, both parties were better off. Management now has a lower level of risk for being accountable for an accident and the employees are less likely to be harmed at work.

5.2. Effecting Factors

Above this is the idea that there are a number of factors that have the ability to increase the risk of an accident that are well within the control of those who issue the work to be completed (Onsite Safety, n.d.). First of these factors is rushing. Rushing to complete a task in the shortest time frame possible both reduces the quality of finish for the work and increases the likelihood that safety procedures for the task will not be followed (Worksafe New Zealand, 2014b). Antarctica is an unforgiving environment, especially in the winter months. Consequently, time pressure is a big constraint on completing a job safely outdoors. If a job is completed to a low standard the first time and one has to spend more time than needed fixing the issue at a later date, there is both an increase in risk of accident and cost for the employer. To resolve this issue, management could put checks in place that ensure the task is being completed by following the correct safety procedures, even if this add more time for the task as a whole.

Next is frustration. In the case of Antarctica, frustration has the potential to become significant if the work is not managed effectively. As discussed earlier, Antarctica is physically isolated from the rest of the world (Steel, 2016). This means that when a task needs to be completed it is sometimes not possible due to so because of a variety of reasons. This could include unfavourable weather or even a delay in procuring the correct parts to complete the task. What management can do in this situation is manage all other variables. If the procedure, communication and materials are all wrong, the likelihood of frustration in the task attempt will be high. This factor also has links back to effective employee selection, as if someone can adapt better to a frustrating situation, the whole organisation is better off.

Fatigue is a killer in a number of industries where concentration is needed in order to make the right decisions (Worksafe New Zealand, 2014a). This is particularly important in Antarctica due to the high latitude and subsequent 24 hour day and night cycle throughout the year. This cycle can be extremely disruptive to the circadian rhythm of someone working on the Ice such that the occurrence of sleep insomnia is high (Steel, 2016). This in turn causes fatigue which can greatly reduce occupational performance. From an employee management point of view it is very important to identify when fatigue

is present within employees to ensure that the task they have been set will not cause this to become an issue or the fatigue will not have an effect on the task at hand.

Finally, complacency in the Antarctic environment is a major issue (Worksafe New Zealand, 2014b). The unpredictable nature coupled with employees spending most of their time living and working in the same environment results in a dangerous mindset. This false sense of security can cause issues which can be exacerbated through poor training and implementation of bad practices. Effective management of this issue is achieved through quick intervention when boredom becomes rife in the process of completing a task. Overall, the mindset of an employee in these situations is the key factor, with effective management, complacency can be minimised along with associated risk of injury.

6. Conclusion

The natural beauty possessed by the Antarctic continent draws one in to investigate, belying the true nature as a harsh and untamed environment (Herrick, 1997). This harsh environment presents challenges to all that carry out activities there. Antarctica New Zealand as a government entity must heed to the legislation introduced in New Zealand. The recent change in Health and safety legislation has facilitated a more top down approach to management where rather than the hazards themselves being managed solely; there is emphasis on both involvement of management and behaviour around potential hazards. Through analysis of past recollections we can confirm the unpredictability of the Antarctic environment and when coupled with observations of health and safety procedure during PCAS 19, it is clear that it is a top priority of Antarctica New Zealand.

One of the most effective tools an employer has in implementing an effective health and safety plan is selection of employees that have the right mindset who are able to function under stressful and testing environmental conditions. There are a number of responses to stressors in the environment that have implications on health and safety protocol relating to the personality traits of the individual. This extends to states of mind that can influence and impact the safety of employees at work, especially in an environment as unforgiving as Antarctica.

Overall, Antarctic health and safety is not an exact science. But if we can apply psychology to why people make certain decisions we can adapt behaviour to ensure that the legislation put in place is effective guiding the process. When we couple this with the recent shift in occupational health and safety regulation, fewer people will be harmed in their line of work.

7. References

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8. Appendices

Appendix 1 – Antarctica New Zealand Health and Safety Policy statement

Health and Safety Policy - 1

Health and Safety

1. VISION

"To continually improve the health, safety and wellbeing of our staff, contractors and visitors to ensure no one is harmed."

2. CONTEXT

Antarctica New Zealand is the Crown Entity responsible for developing, managing and executing New Zealand Government activities in Antarctica. We operate in high-risk environments with diverse hazards, and in office and warehouse settings. Antarctica New Zealand understands that people are key to our success, and we are dedicated to ensuring the safety and wellbeing of all staff, contractors and visitors.

3. POLICY EXPECTATIONS

To meet our vision, Antarctica New Zealand is committed to:

- providing a safe and healthy working environment for all staff, contractors and visitors; and
- providing and maintaining a proactive, positive and open health and safety culture; and
- complying with, and where possible exceeding, the requirements of the Health and Safety in Employment Act 1992, Health and Safety at Work Act 2015 and all other relevant acts, regulations, approved codes of practice, guidelines and advisory standards; and
- continuous improvement of our health and safety system and its performance; and
- obtaining and maintaining accreditation of our health and safety system to OHSAS 18001: 2007; and
- recognising that all incidents are preventable and that we will achieve *zero harm*; and
- ensuring open and timely reporting and investigation of incidents; and
- supporting the return of any injured employees to work.

To meet our vision, Antarctica New Zealand will:

- encourage employee participation in all aspects of health and safety; and
- recognise employees' expertise and insight to support continuous improvement in Health and Safety; and
- proactively identify hazards, their associated risks and all unsafe acts and conditions; and
- implement all reasonably practicable control measures to eliminate and minimise the exposure to risk; and
- Implement a health and safety management system in consultation with staff, whilst ensuring adherence to the organisation's commitments, values, and obligations; and
- provide training, information, instruction and supervision for staff, contractors and visitors in order for them to undertake their duties and activities in a safe and healthy manner; and
- set lead and lag measures of health and safety performance, and report these to our leaders, staff, contractors and visitors at least quarterly; and

- empower staff, contractors and visitors to stop any work they believe is unsafe or cannot be continued safely; whilst remaining impartial to anyone who stops work they believe is unsafe or cannot be continued safely, allowing work to cease without fear of reprisal; and
- ensure this policy is communicated, understood and implemented by our leaders, staff, contractors and visitors, and reviewed at least annually.

Reviewed by: Peter Beggs
CHIEF EXECUTIVE

Date: 7 December 2015

Signature: